CSC477: Introduction to Mobile Robotics
Quiz 1, Linear Quadratic Regulator

Name:
Student #:
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1 (1 pt)

You are given an omnidirectional robot that moves on the 2D plane without friction. We can control the velocity of this robot. Write down a dynamics model that describes the motion of the robot. Can we apply LQR to this system?

2 (0.5 pt)

Write down a cost function that will stabilize the robot at state zero.

3 (0.5 pt)

Is the transition cost function $g(\mathbf{x}, \mathbf{u}) = \mathbf{x}^T \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \mathbf{x} + \mathbf{u}^T \mathbf{u}$ valid for use in LQR control? Justify your answer.